

CLAIMS

What is claimed is:

1. 1. A composition of matter comprising a metal complex having the following general formula:

3. 3.
$$\begin{array}{c} B_1 \\ | \\ R_1 \text{---} M \text{---} R_2 \\ | \\ H_1 \text{---} A_1 \text{---} H_2 \text{---} A_2 \\ | \\ B_2 \end{array}$$

4. 4. **Formula I**

5. 5. wherein;

6. 6.

7. 7.

8. 8. **wherein:**

9. 9.

10. 10. B_1 and B_2 may be same or different and are selected from -Ar-

11. 11. T-Ar-, -T-Ar-T- and -T-, wherein Ar is an aromatic ring;

12. 12.

13. 13. T is a saturated or unsaturated, cyclic or acyclic, chiral or achiral

14. 14. hydrocarbon group with from 1 to 10 carbon atoms and one or

15. 15. more carbons in T may be replaced with one or more

16. 16. heteroatoms or groups selected from O, S, SO, SO₂, NR₃,

17. 17. where R₃ is H, alkyl (C1-4), cycloalkyl (C3-6), aryl, aralkyl and

18. 18. acyl (C2-6); or (SiR₄R₅)_n, where n is 1 or 2 and -Si(R₄R₅)-O-

19. 19. Si(R₄R₅)-, where R₄ and R₅ may be same or different and are

20. 20. selected from alkyl (C1-4), cycloalkyl (C3-6), aryl and aralkyl;

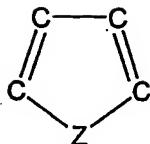
21. 21.

22. 22. A_1 and A_2 may be same or different and is a saturated or

23. 23. unsaturated, substituted or unsubstituted, chiral or achiral cyclic

24. 24. ring structure, for example, a cycloalkyl or

25. 25.



26
27

28 where, Z is selected from O, NR₃, S, CR₆=CR₇, CR₆=N and
29 N=CR₆ and when R₆ and R₇ are H, then the ring may be
30 optionally substituted with one or more substituents, Q, selected
31 from H, alkyl, alkoxy, amino, carboxy, cyano, halo, hydroxy, nitro
32 and trifluoromethyl and R₆ and R₇ may further combine to form a
33 cyclic ring, optionally substituted with one or more heteroatoms
34 selected from O, N and S and may contain at least one
35 doublebond;

36

37 H₁ and H₂ are independently selected from any one of the
38 heteroatoms comprising N, P, O and S and these heteroatoms
39 can be either in neutral form or exist as the corresponding anion
40 when protons linked to said heteroatoms are removed;

41

42 R₁ and R₂, connected to H₁ and H₂ through either a single bond,
43 a double bond or a combination of both, may be same or
44 different and are selected from alkyl, aryl, aralkyl, optionally
45 substituted with alkyl, alkoxy, amino, carboxy, cyano, halo,
46 hydroxy, nitro and trifluoromethyl or R₁ and R₂ may combine
47 through an alkylene or substituted alkylene bridge to form a
48 cyclic ring in case of bidentate ligands (Appendix 1) and one or
49 more methylene groups of said alkylene bridge may be
50 substituted with an heteroatom, G, selected from O, P, S and N
51 or an heterocyclic ring containing such an heteroatom in case of
52 tridentate ligands;

53

54 R' and R" are alkyl, alkenyl, aryl, aralkyl and cycloalkyl;

55

56 X and Y are selected from halogens, pseudo-halogens,
57 carboxylic acid esters, amino, substituted amino, alkoxy or
58 aryloxy group; and

59

60 M is a transition group metal ion or a main group metal ion and
61 is selected based on the type of ligand and comprise Fe, Ru,
62 Os, Rh, Ir, Ni, Pd, Pt, Cu, Zn, Al, Ti, Zr, Hf, V, Nb, Ta, Cr, Mo
63 and W.

- 1
2. A composition according to Claim 1 wherein the aromatic ring AR is selected from the group consisting of: phenyl, furyl, thienyl, pyrrolyl, indolyl, isoindolyl, pyridyl and naphthyl.

1 3. A composition according to Claim 1 wherein B₁, B₂, A₁ and A₂
 2 comprise phenyl rings and the linkages from B₁ to B₂ to A₁ to A₂ to
 3 B₁ are through either the 1,3 or 1,4 positions of each ring moiety.

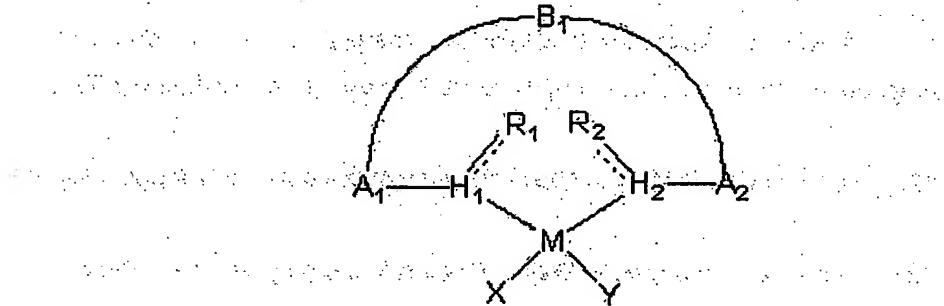
1 4. A composition according to Claim 1 wherein B₁, B₂, A₁ and A₂
 2 comprise a heterocyclic ring.

1 5. A composition according to Claim 4 wherein the heterocyclic
 2 ring has 5 members and wherein the linkages B₁ to B₂ to A₁ to A₂ to B₁
 3 are through any of C₂-C₅.

1 6. A composition according to Claim 4 wherein the heterocyclic
 2 ring has 6 members and wherein the linkages B₁ to B₂ to A₁ to A₂ to B₁
 3 are through any of C₂-C₆.

1 7. A composition having General Formula I of Claim 1 wherein B₂ is
 2 absent, such composition having General Formula II, as follows:

3

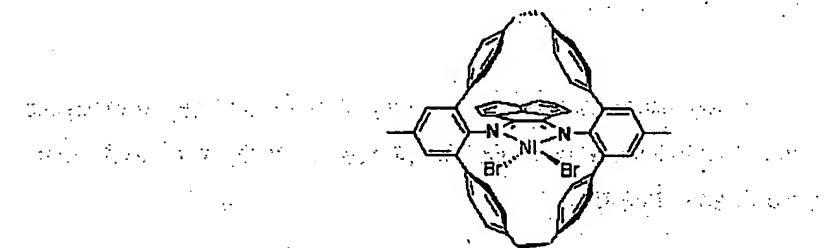


Formula II

4

1 8. A composition according to Claim 1 wherein the complex comprises a
2 cyclophane-based Ni^{II}- α -diimine complex.

1 9. A composition according to Claim 8 having Formula III as follows:



3
4
5
6
7
8
9
10. A method for preparing an polymer, said method comprising the step
11 of:
12 A) reacting at least one monomer or prepolymer in the presence of
13 a catalyst comprising a composition according to Claim 1.

1 11. A method according to Claim 10 wherein at least a portion of the
2 reaction in Step A occurs at temperatures in excess of approximately 50°C.

1 12. A method according to Claim 10 wherein the polymer is a polyethylene.

1 13. A method according to Claim 10 wherein the polymer is a polyolefin.

1 14. A method according to Claim 10 wherein the method comprises a gas
2 phase polymerization.